BRIDGER LAKE

Introduction

Bridger Lake sits in a glacial valley on the north slope of the Uinta Mountains. It is a small, natural impoundment, formed by a dam of lateral moraine in the Smith's Fork valley. It is in a cluster of four lakes and reservoirs just south of the Wyoming state line (Bridger Lake, Marsh Lake, and China Lake.)

The reservoir shoreline is 100% publicly owned by the Wasatch-Cache National Forest. Public access is unrestricted. Water is used for recreation and cold water aquatic life. The passage of water through the lake is unregulated by man, but water that flows through it is later stored in Stateline Reservoir and used for agricultural purpose in Wyoming.

Characteristics and Morphometry

Elevation (meters / feet)	2,854 / 9,364
Surface area (hectares / acres)	8.5 / 21
Watershed area (hectares / acres)	
Volume (m^3 / acre-feet)	
Capacity	337,000/273
Conservation pool	not measured
Annual inflow (m^3 / acre-feet)	
Retention time (years)	
Depth (meters / feet)	
maximum	5 / 15
mean	4 / 13
Length (meters / feet)	671 / 2,200
Width (meters / feet)	213 / 700
Shoreline (meters / feet)	1,280 / 4,200

Location

County	Summit
Longitude / Latitude	110 23 09 / 40 57 46
USGS Map	Bridger Lake, UT / WY 1967
DeLorme's Utah Atlas and Gazetteer™	Page 55, A-5
Cataloging Unit	Black's Fork (1404017)

Recreation

Bridger Lake is in the Smith's Fork drainage, 30 miles east of U-150 on the North Slope Road (FS-058). It is also

File Contains Data for PostScript Printers Only

accessible from Mountain View, Wyoming. Go south from Mountain View on the paved road towards Robertson (not towards Lonetree). At the second 90° bend to the west (about 5 miles from Mountain View), leave the highway, continuing south on a gravel road that becomes FS-072.

Bridger Lake is 2 miles south of the Wyoming State Line. The lake is 1/2 mile south of the turnoff to Stateline Reservoir. Located at the lake are the Bridger Lake Guard Station and the Bridger Lake Campground on the west shore. The route to the lake is well marked.

The lake offers fishing, boating and some degree of solitude. The area is noted for good moose habitat with frequent observations noted. The water is too cold for most swimmers. Fishing is popular, and there is a concrete boatramp for launching small boats. It should be noted that there is a 5 hp restriction on motors used on this small lake.

Bridger Lake Campground, administered by the Forest Service, has recently been refurbished (1993). It has 30 campsites, each with a fire pit, barbeque grills, and drinking water. There are two vault toilets, and two of the campsites have been developed with cement pads with a concrete pathway to the restroom facilities for those individuals with special needs. Reservations can be made through Biospherics, the new national reservation system for camping in National Forest camp areas. User fees are charged. There are several other USFS campgrounds in the vicinity, including Stateline, Trail Head, Marsh Lake, China Meadows, and Smiths Fork Trail Head. This area provides access to the popular High Uinta Wilderness, so campgrounds are heavily used in the summer.

Watershed Description

Bridger Lake is on the east side of the valley floor. The valley is about two miles wide and 800' deep. The lake's watershed is a portion of the glacial valley floor, about one mile wide and four miles long, stretching due south from the lake. There is a perennial stream flowing down the watershed, and several smaller glacial lakes near the top. The entire watershed consists of glacial valley floor that has been separated from the river by a long lateral moraine. (The China Lake report has a complete description of the process of glaciation.)

The watershed high point, a point two miles southwest of the lake on the valley wall, is 3,118 m (10,230 feet) above sea level, thereby developing a complex slope of 7.0% to the reservoir. The inflow consists of an unnamed stream that flows north into the lake. The stream gradient is 3.5% (186 feet per mile). The outflow is the continuation of this stream, which flows into Stateline Reservoir (an impoundment of Smiths Fork) about two miles downstream from Bridger Lake.

The soil in the watershed is derived from glacial till, alluvium, and the sedimentary rocks of the east wall of the valley. It is comprised primarily of debris from the scouring of upstream valleys, so the till itself is chemically similar to the Precambrian rocks of the High Uintas. See Appendix III for a complete soil description.

The vegetation community is comprised of lodgepole pine and marshlands. The watershed receives 51 - 64 cm (20 - 25 inches) of precipitation annually with a frost-free season of 20 - 40 days.

Land use is about 75% multiple use and 25% intensive agriculture. The major use of the watershed is sheep grazing, which has increased soil erosion. The campground and ranger station lie within the watershed.

Limnological Assessment

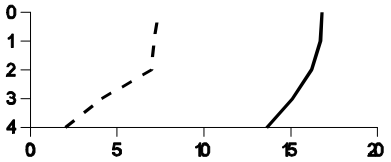
The water quality of Bridger Lake is very good. It is considered to be moderately soft with a hardness concentration near 40 mg/L ($CaCO_3$). The only parameter that has exceeded State water quality standards for defined beneficial uses is phosphorus. The average concentration of total phosphorus in the water column in August, 1992 was 0.045 mg/L which is significantly higher than the recommended pollution indicator for phosphorus of 0.025 mg/L. The phosphorus concentrations on an annual basis was only slightly higher with an average value of 0.033 mg/L. No other constituents analyzed indicate any water quality impairments. In 1981 the system was not characterized for a limiting factor due to nutrient concentrations below detection limits. In 1992 with nutrient concentrations well above detection limits the lake has been classified as a nitrogen limited system. TSI values indicate the lake is mesotrophic. It does appear that there has been a significant rise in the concentrations of nutrients in the lake since it was originally surveyed in 1981. It is very important that these constituents continue to be monitored to see if this is an actual trend or a more consistent evaluation of conditions in the lake. Although the lake has a mean depth of only 4 meters it appears

Limnological Data

Data sampled from STORET site: 593937

Surface Data	1981	1992
Trophic Status	-	M
Chlorophyll TSI	-	41.70
Secchi Depth TSI	-	50.75
Phosphorous TSI	-	47.70
Average TSI	-	46.72
Chlorophyll a (ug/L)	-	3.1
Transparency (m)	-	1.9
Total Phosphorous (ug/L)	30	20
pH	6.7	7.7
Total Susp. Solids (mg/L)	<5	<3
Total Volatile Solids (mg/L)	-	1
Total Residual Solids (mg/L)	-	2
Temperature (°C / °f)	18/64	14/57
Conductivity (umhos.cm)	78	98
Water Column Data		
Ammonia (mg/L)	0.05	0.12
Nitrate/Nitrite (mg/L)	0.1	0.07
Hardness (mg/L)	40	40
Alkalinity (mg/L)	37	46
Silica (mg/L)	-	4.4
Total Phosphorus (ug/L)	40	31
Miscellaneous Data		
DO (Mg/l) at 75% depth	-	4.1
Stratification (m)	-	2-4
Limiting Nutrient	N	N
Depth at Deepest Site (m)	-	4.0

from the profile of August 11, 1992 that a mild stratification was present. Consistent with the stratification there is a noticeable decline in the concentration of dissolved oxygen in the water column. Below 2 meters the concentration declines to a low of 2.0 mg/L at the bottom. Due to the shallow nature of the lake the stratification is probable weak and may be broken down by wind and wave action. These conditions are probably critical to the overwintering of fish in the lake and is consistent with the reporting of some fishkills. There are extensive coverage of emergent macrophytes (lily pads) in close proximity to the shoreline.



D	°C	pH	DO Cond
0	16.8	7.4	7.4 100
1	16.7	7.3	7.1 100
2	16.2	7.3	7.0 100
3	15.1	7.1	4.1 100
4	13.6	7.0	2.0 100

The DWR stocks the lake annually with 4,000 catchable rainbow trout (*Oncorhynchus mykiss*). In 1992, 2,100 fingerling brook trout (*Salvelinus fontinalis*) were also stocked.

The lake was chemically treated by the DWR to control rough fish competition in 1973, so native fish populations may not be present.

Phytoplankton in the euphotic zone include the following taxa (in order of dominance)

Species	Cell Volume (mm^3/liter)	% Density By Volume
Botryococcus braunii	11.120	46.02
Sphaerocystis schroeteri	10.564	43.72
Dinobryon divergens	1.773	7.34
Peridinium sp.	0.361	1.50
Staurastrum sp.	0.166	0.69
Anabaena sp.	0.111	0.46
Oocystis sp.	0.033	0.14
Ankistrodesmus falcatus	0.013	0.05
Chroococcus sp.	0.011	0.05
Crucigenia sp.	0.006	0.02
Pennate diatoms	0.004	0.02
Total	24.162	
Shannon-Weaver [H']	1.05	
Species Evenness	0.44	
Species Richness	0.42	

As observed the algal community is dominated by two species of green algae indicative of good water usually oligotrophic to mesotrophic conditions.

Information

Management Agencies

Wasatch-Cache National Forest	524-5030
Mountain View Ranger District	307-782-6555
Mountainland Association of Governments	377-2262
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146
Recreation	
Mountainland Travel Region (Provo)	377-2262
Biospheric Nat'l Reservation Center	1-800-280-2667

Pollution Assessment

Nonpoint pollution sources include grazing and recreation. In addition to sheep grazing in the area cattle graze in the watershed and around the reservoir. The campground and guard station are on the west shore, where heavy recreational use can degrade the riparian vegetation. There are no point pollution sources in the watershed.

Beneficial Use Classification

The state beneficial use classifications include: boating and similar recreation (excluding swimming) (2B), cold water game fish and organisms in their food chain (3A) and agricultural uses (4).